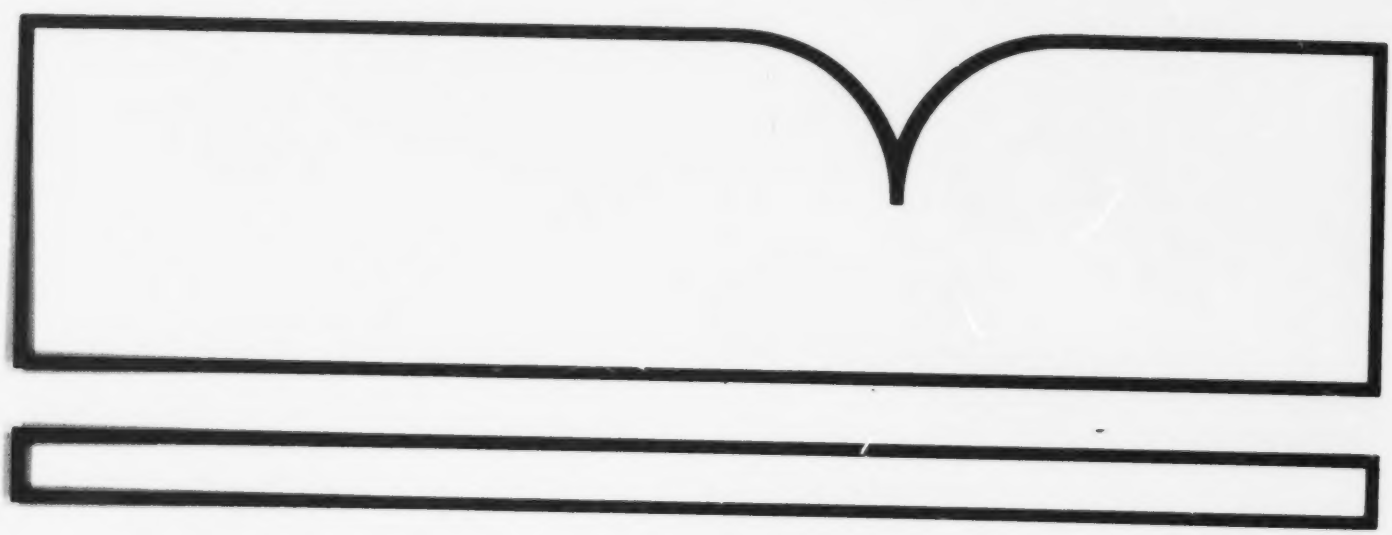
PB91-145912

Quality of Our Nation's Water: A Summary of the 1988 National Water Quality Inventory

(U.S.) Environmental Protection Agency, Washington, DC

May 90



U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of Water
Washington DC 20460

EPA 440/4-90-005
May 1990

EPA

The Quality of Our Nation's Water

PB91-145912

A Summary of the 1988 National Water Quality Inventory

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

CONTENTS

The Quality of Our Nation's Water	1
Our Nation's Water Resources	2
What is Water Pollution?	4
Monitoring Our Nation's Waters	6
Rivers and Streams	8
Lakes and Reservoirs	10
The Great Lakes	12
Estuaries	14
Coastal Waters	15
Wetlands	16
Ground Water	18
Water Quality Protection	20
You Can Make a Difference	22

Judith B. Trimarchi

A view of the Pecos River in northern New Mexico.

Front cover: *Acadia National Park, Maine*
Photo by *Judith B. Trimarchi*

Printed on Recycled Paper

All photographs are courtesy of individual and or organization listed.

BIBLIOGRAPHIC INFORMATION

PB91-145912

Report Nos: EPA/44Ø/4-9Ø/ØØ5

Title: Quality of Our Nation's Water: A Summary of the 1988 National Water Quality Inventory.

Date: May 9Ø

Performing Organization: Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.

Supplementary Notes: Also available from Supt. of Docs.

NTIS Field/Group Codes: 68D, 48B, 48G, 47

Price: PC AØ3/MF AØ1

Availability: Available from the National Technical Information Service, Springfield, VA. 22161

Number of Pages: 27p

Keywords: *Water resources, *Water pollution, *United States, Surface waters, Streams, Rivers, Lakes, Estuaries, Coasts, Ground water, Protection, Maps, Booklet, Wetlands.

Abstract: Contents: The Quality of Our Nation's Water; Our Nation's Water Resources; What Is Water Pollution; Monitoring Our Nation's Waters; Rivers and Streams; Lakes and Reservoirs; The Great Lakes; Estuaries; Coastal Waters; Wetlands; Ground Water; Water Quality Protection; and You Can Make a Difference.

THE QUALITY OF OUR NATION'S WATER

Introduction

What is water pollution? How does it affect the Nation's rivers, lakes, estuaries, coastal waters, wetlands, and ground waters? Are we making progress cleaning up our waters? What can *you* do to help?

If these questions interest you, read on. This booklet has been developed to provide answers to these questions, based on our best available current information. It is meant as an introduction to the water quality issues, concerns, and facts of today and is drawn from an EPA report to Congress on National Water Quality. It is not a technical report and it cannot, by its very nature, answer *all* questions about water pollution. But it *can* serve to encourage you, the reader, to become educated about water quality issues and involved in the decisions that affect our waters.

Why is this important? It is important because we have abused our water resources for centuries. As our society has become more complex, our growing population has put greater stress on our water resources and we have made greater use of a range of synthetic chemicals. We have dumped untreated or poorly treated wastes into our rivers, lakes and oceans; we have drawn water out of the ground faster that it can be replenished; we have used and overused the land without thought to erosion and contaminated runoff; we have built our houses, cities, dams, bridges, and roads wherever we pleased, regardless of our impact on the natural environment. These actions began when mankind first began to alter the natural environment, and they continue today.

Today, however, we are beginning to question. We are beginning to learn about the natural links between ourselves and our environment, to search for solutions to the problems we have created. We are beginning to recognize our role as stewards of the environment, entrusted with its care and protection.

Clean Waters—How Far Have We Come?

Much work remains to be done, as this booklet will show. However, it is easy to lose sight of how far we have come in cleaning up our water resources. Young people in particular may not be aware of how badly polluted many of our rivers and lakes were in the 1950s and 1960s. Many rivers smelled foul due to complete lack of oxygen and supported only the most pollution-tolerant organisms. Urban waters were plagued by untreated or poorly treated sewage wastes and industrial chemicals, and were covered with oil and debris. At least one river was so polluted it actually caught fire on four separate occasions!

These forms of gross pollution are largely a thing of the past. Through substantial investment in the treatment of sewage and industrial wastes, we have cleaned up many rivers. Fish have returned to waters that once could not support them, and people are safely swimming in areas that once were off-limits. Our pollution control efforts have kept pace with a rapid rise in population: 59 million more people are now served by improved levels of sewage treatment than in 1972, and significant reductions have occurred in pollutant loads from sewage treatment facilities and industries.

However, that doesn't mean that our water resources are as clean as they could be. To a large extent, we have done the "easy" work—controlling the discharges from sewage treatment plants and industries that enter waters via discrete points such as pipes (known as "point source" pollution). But our water quality information tells us that nontraditional sources of pollution—especially stormwater runoff from urban/suburban areas and "non-point sources" of pollution originating from diffuse areas and land use activities such as farming, timbering, and construction—are now the leading reasons for water quality problems. We are also learning more about subtle risks to aquatic ecosystems and human health resulting from toxic chemicals. These problems pose difficult cleanup challenges, but like the problems that came before, they *can* be solved. How much progress we make in coming years is limited only by our understanding of these problems and by our commitment, as individuals and as a society, to solving them.

Steve Delaney

Skipjack on the Chesapeake Bay.

Our Nation's Water Resources

Current estimates tell us that there are about two million miles of rivers and streams in the U.S., nearly 40 million acres of lakes and reservoirs (excluding the Great Lakes), and about 36,000 square miles of estuaries. The Great Lakes hold one fifth of the world's fresh water. We are only now beginning to map the extent of wetland areas of the U.S.—the swamps, marshes, prairie potholes, and wet meadows that are flooded or saturated by water for various times each year. These surface waters, the oceans, and the water that lies below ground in water-bearing rock formations are all linked by nature into the hydrologic cycle (see Figure below).

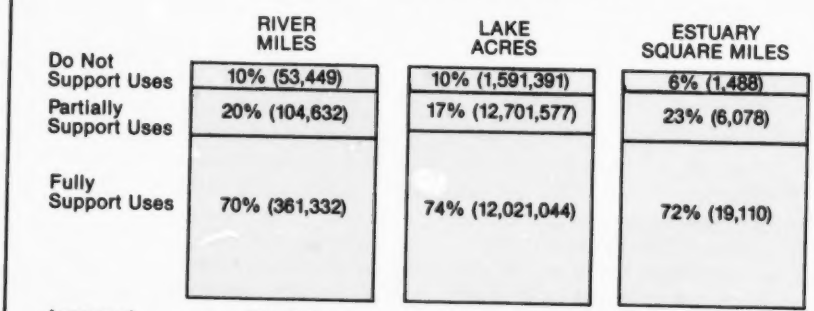
They are also linked by our actions—specifically, by the uses to which we put them. When we dam rivers to generate electric power or drain wetlands to increase our farming acreage, we alter the relationship of these waters to the natural environment: to downstream waters, to the animal and plant communities that depend on them, to the land over which they flow. When we pollute our rivers, rivers may carry those pollutants to lakes or all the way to the sea. When we extract too much ground water for irrigation or to allow cities to bloom in the desert, we dry out the mountain springs that feed the rivers.

Designated Uses—A Basic Concept

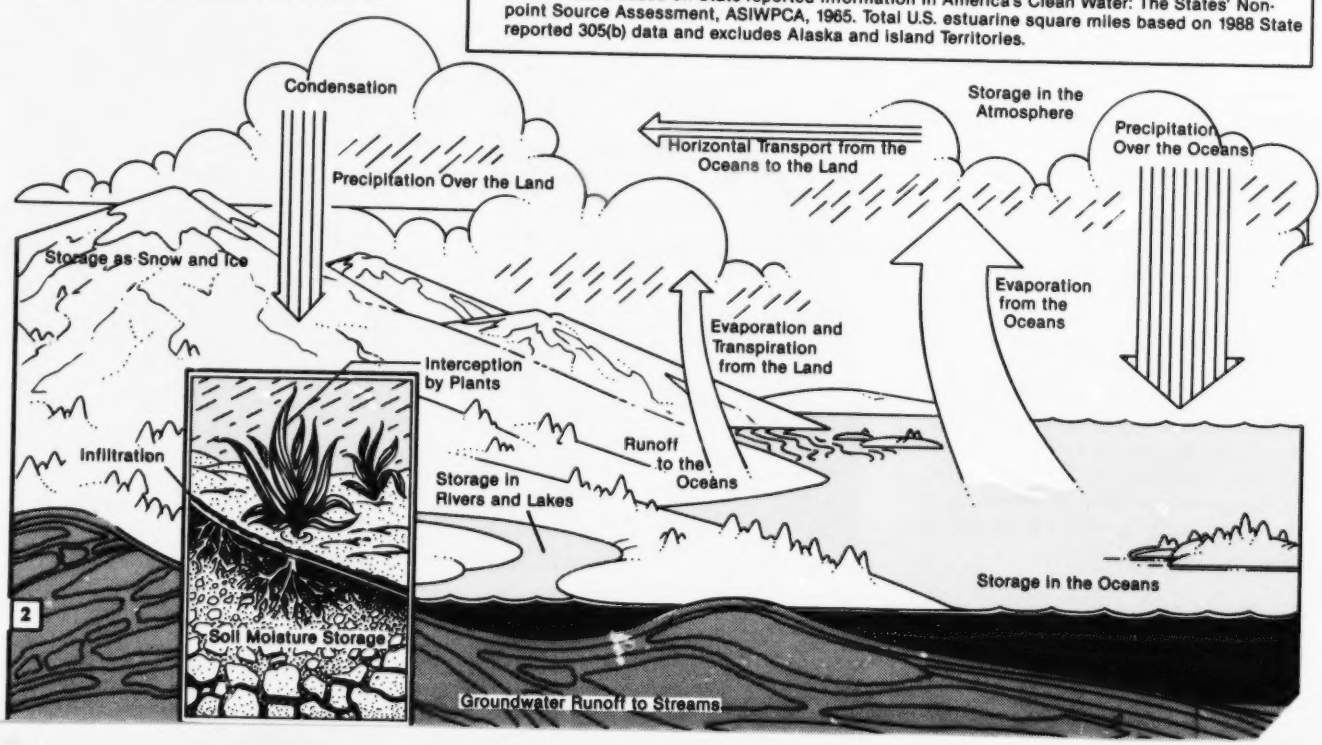
All waters of the U.S. are required by law to be designated for "beneficial uses" that must then be protected. These uses establish a level of quality that is the goal for water quality management. Waters classified for support of aquatic life and contact recreation should be usable for fishing and swimming. A smaller set of waters are designated as public water supplies—with some treatment, this is the water that is piped into homes for drinking and bathing.

Once States have set these uses for their waters, scientists establish criteria necessary to protect those uses. These criteria are requirements such as chemical or habitat conditions that must be met in order to maintain compliance with the goals. If these criteria are not met, the uses they are protecting may be impaired.

Degree of Designated Use Support in the Nation's Assessed Waters



*Total waters based on State-reported information in America's Clean Water: The States' Nonpoint Source Assessment, ASIWPCA, 1965. Total U.S. estuarine square miles based on 1988 State reported 305(b) data and excludes Alaska and Island Territories.

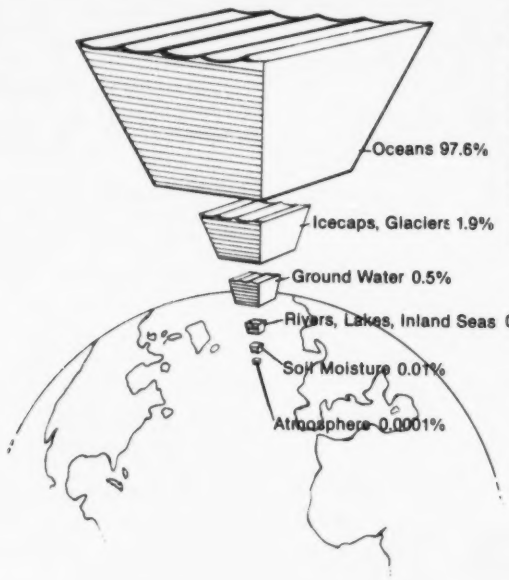


Together, water quality criteria and designated uses comprise each State's water quality standards, which must be approved by EPA. It is by assessing the degree to which standards are met and designated uses are supported that we determine the status of the Nation's waters.

The basis for this report—The 1988 National Water Quality Inventory

Every two years, the States report to the U.S. Environmental Protection Agency (EPA) on the quality of their rivers, streams, lakes, estuaries, coastal waters, wetlands, and ground water. EPA, in turn, prepares and delivers a summary report to Congress. This information is used to assess the effect of current water quality protection policies, and to help determine where improvement is needed.

This booklet explains the findings in the 1988 National Water Quality Inventory Report to Congress. It begins by exploring the nature and impacts of water pollution; discusses how we monitor water quality and points out the limits of our available data; summarizes what States report on quality conditions; briefly highlights some of the steps that are being taken to restore and protect our water resources; and describes actions that you, as an individual, can take to make a difference.



This figure shows the relative amounts of free water in storage on the earth. Nearly 98 percent of the water is stored in the oceans. Glaciers and ice caps contain the largest store of fresh water, but this water is relatively unavailable to man. Most of the readily available fresh water is stored in porous rock beds as groundwater. The amount of water stored in the atmosphere is relatively small, but because it is actively transported it plays a key role in the hydrologic cycle. (After Nace, 1969)

Judith B. Trimarchi

Geese in a salt-water marsh on Cape Cod, Massachusetts.

WHAT IS WATER POLLUTION?

Water pollution is a broad term. It refers to the alteration of aquatic ecosystems such that aquatic life may be impaired or destroyed, human health may be threatened, or water may become so foul that recreation and aesthetic enjoyment are no longer possible. This alteration may occur when substances such as chemicals, sediments, and excess nutrients are introduced into our waters. However, water pollution also includes other actions that alter aquatic ecosystems, such as dredging or changing flow characteristics.

When we think of pollution, we often conjure up images of oil spills, raw sewage, chemicals spewing from factory pipes, and medical wastes washing up on public beaches. While these are indeed critical concerns, other water pollution problems are more widespread, and less obvious. Removing the natural vegetation along a stream, which can result in the loss of the natural biological community, is one such widespread pollution problem.

In fact, the most striking finding of the States' reports to EPA for 1988 is that the leading causes of impaired water uses are excess nutrients and sediments. These, and the other types of pollution reported, are contributed by a variety of sources (see Box).

Dealing effectively with the water pollution problems our Nation faces will, in large part, involve tracing the various causes of pollution back to their sources and working to reduce or eliminate the amount of pollution generated by each source.

Pollution Source Categories Used in this Report

Category	Examples
Industrial	Pulp and paper mills, chemical manufacturers, steel plants, textile manufacturers, food processing plants
Municipal	Publicly-owned sewage treatment plants that may receive indirect discharges from small factories or businesses
Combined Sewers	Storm and sanitary sewers combined, which may discharge untreated wastes during storms
Storm Sewers/ Runoff	Runoff from streets, paved areas, lawns, etc., that enters a sewer, pipe or ditch before discharge
Agricultural	Crop production, pastures, rangeland, feedlots
Silvicultural	Forest management, harvesting, road construction
Construction	Highway building, land development
Resource Extraction	Mining, petroleum drilling, runoff from mine tailing sites
Land Disposal	Leachate or discharge from septic tanks, landfills, hazardous waste disposal sites
Hydrologic Modification	Channelization, dredging, dam construction, stream bank modification

Nutrients

Nutrients, such as the nitrates found in fertilizers and phosphates found in detergents, overstimulate the growth of aquatic plants and algae. These organisms begin to choke the water, use up dissolved oxygen, and cut off light in deeper waters. This seriously affects the respiration of fish and aquatic invertebrates, leads to a decrease in animal and plant diversity, and affects our ability to use the water for fishing, swimming, and boating. Lakes and estuaries are particularly vulnerable to the effects of excess nutrients.

Sediments

When it rains, silt and other suspended solids wash off plowed fields, construction and logging sites, urban areas, and strip-mined land. As these solids enter rivers, lakes, and coastal waters, fish respiration is impaired, plant productivity is reduced, aquatic habitats are smothered, and our aesthetic enjoyment of the water is reduced.

Bacteria/Viruses/Protozoans

Certain waterborne bacteria, viruses, and protozoans can cause human illnesses that range from typhoid and dysentery to minor respiratory and skin diseases. These organisms can enter our water via a number of routes, including sewers, storm water drains, septic systems, runoff from livestock pens, and boats that dump sewage. Since it is impossible to test water for every type of organism, fecal coliform bacteria are measured as indicators that the water may have been contaminated with untreated sewage and that other, more dangerous organisms may be present.

Organic Enrichment

Organic material may enter the water in many forms—sewage, leaves and grass clippings, or runoff from livestock feedlots and pastures. As the natural bacteria and protozoa in the water break down this organic material, they begin to use up the oxygen dissolved in the water. When levels of dissolved oxygen drop, many types of fish and bottom dwelling animals cannot survive.

Toxic Chemicals/Heavy Metals

Metals (such as mercury, lead, selenium, and cadmium) and toxic organic chemicals (such as PCBs and dioxin) may originate in industrial discharges (either direct, or indirect via sewage treatment plants), runoff from city streets, mining activities, leachate from landfills, and a variety of other sources. They can cause death or reproductive failure

in fish, shellfish, and wildlife, and pose health risks to humans.

Pesticides/Herbicides

Rainfall and irrigation can wash pesticides and herbicides used on farm land, lawns, and in termite control into ground and surface waters. These contaminants are generally very persistent in the environment and may accumulate in fish, shellfish, and wildlife to levels that pose a risk to human health and the environment.

Habitat Modification

Loss of habitat occurs when streams and lakes are modified by activities such as grazing, farming, channelization, construction of dams, and dredging. Typical examples of habitat modification include loss of stream-side vegetation, siltation, smothering of bottom dwelling organisms, and increased water temperatures.

Other Pollutants

Other water pollutants are also reported, although to a somewhat lesser extent. For example, waters may become unfit for aquatic life and some human uses when they become contaminated by salts. Sources of salinity include irrigation runoff, brine used in oil extraction operations, and the infusion of sea water into fresh ground and surface waters in coastal areas. Problems with pH are of concern in areas with many abandoned mines (acid mine drainage) and areas susceptible to acid rain. pH can alter the toxicity of other chemicals in water, and can render lakes and streams unfit for aquatic life. Other pollutants of concern include crude oil and processed petroleum products spilled during extraction, processing or transport; and increased water temperatures resulting from industrial cooling processes or habitat modification.

SPECIAL CONCERNS: FISH KILLS

One obvious and important indicator of water quality problems is the occurrence of fish kills caused by pollution. The information reported by the States in 1988 probably underestimates the extent of the problem because reporting of pollution-caused fish kills is voluntary and incomplete. Of 37 States reporting on fish kills in the 1986–1988 period, 35 States indicated there had been a total of 996 incidents, involving the death of at least 36 million fish.

Toxic substances such as heavy metals and pesticides appear to be a less common cause of fish kills than conventional pollutants such as biochemical oxygen-demanding (BOD) substances. Leading causes of fish kills include BOD/low dissolved oxygen, oil and gas, pesticides, ammonia, chlorine, herbicides, and temperature change. The most commonly reported sources of such pollution are agriculture (in particular, runoff from livestock pens, and the application of fertilizers and nutrients), spills, municipal sewage treatment plants, and industrial dischargers.

Fish Kill Distribution Nationwide

Source: 1988 State Section 305(b) Reports

MONITORING OUR NATION'S WATERS

The States and EPA share responsibility for monitoring the quality of U.S. surface waters. States receive Federal funds to conduct water quality monitoring and report to EPA, and EPA provides guidance, technical support, and conducts studies addressing issues of national concern.

What kinds of data are collected by the States? Do all States use the same methods? How good is our information? The answers to these questions are key to understanding the findings reported by the States and summarized in this booklet.

What Kinds of Data Are Collected?

States collect a variety of information on water quality conditions using two basic methods—monitoring and evaluation.

Monitoring data can be provided by networks of chemical or biological sampling stations located near dischargers or at other strategic points along a waterbody. Short-term or one-time intensive or special surveys also provide monitoring data for discrete areas or to answer questions about specific problem sources or conditions. The data collected may be chemical (such as the concentration of a given pollutant in water, sediment, or fish tissue) or biological (such as counts of the number of species in a given area or tests of the toxicity of ambient water or wastewater samples). Monitoring data are collected using quality control procedures and actual observations and samples of water, sediments, tissue, and organisms.

Evaluative data, on the other hand, are collected from sources that may not use quality control procedures or involve actual sampling at aquatic sites. Examples of this type of data include information provided by volunteer monitors, reports of pollution-caused fish kills, screening using predictive models, and surveys of fishery biologists and game wardens.

These two types of data supplement each other and help us gain the best possible insight into the condition of our waters.

Do All States Use the Same Methods?

States approach their water monitoring responsibilities in many different ways. Because of limited resources, States generally concentrate their monitoring activities in waters that are most degraded or most heavily used. Some may rely almost exclusively on one type of monitoring activity (such as networks of chemical sampling stations) or may use a variety of monitoring and evaluative approaches. Once data are collected, they must be analyzed using established procedures to determine if designated uses are being met.

EPA issues guidelines to encourage the use of consistent procedures among States, but wide variation remains in monitoring approaches, analysis of data, and comprehensiveness of reporting.

Ed Rankin

Biologist from the Ohio EPA Sampling on the Scioto River.

SPECIAL CONCERNS: SEDIMENT CONTAMINATION

Contamination of sediments by toxic substances is a problem of growing concern in the United States. Contaminants can be retained in sediments for many years after a source has ceased releasing them, and serve as a continuing source of toxic pollutants that harm the indigenous aquatic life. Sediment contamination also poses obstacles to the maintenance dredging of navigation channels. Dredging stirs the contaminants back into the water, and disposal of contaminated dredge spoils may be a problem.

Methods of analyzing sediments are still in their infancy. EPA is working to issue criteria for contaminants in sediment, and is documenting methods of assessing and cleaning up problems. Many States do not have the analytical tools or resources for sediment monitoring. Therefore, our knowledge of the extent of sediment problems is limited.

Of 35 States that discussed sediment contamination in their 1988 report, 34 indicated that contamination exists in some areas. A total of 533 separate instances of sediment contamination were reported. Common contaminants include copper, mercury, lead, cadmium, chromium, zinc, PCBs, DDT, chlordane, and dieldrin.

How Good is our Information?

As a result of this variation, our knowledge of water quality conditions is limited. In 1988, about 30 percent of the Nation's river miles and 40 percent of its lake acres were assessed to determine if designated uses were supported. Inconsistent methods of monitoring and analysis make it difficult to compare findings between States and limit EPA's ability to draw national conclusions.

It is also clear that most of the monitoring effort is directed toward supporting regulatory actions and not toward problems such as diffuse sources of pollution (e.g., agricultural runoff) and ecological impacts (e.g., loss of stream habitat) for which there are fewer regulatory controls.

Our need for good monitoring data has never been greater. Passage of the Water Quality Act of 1987 added new requirements to evaluate the effects of diffuse sources of pollution, to identify waters impaired by toxic substances, and to evaluate the condition of lakes and estuaries.

We are beginning to see the results of this new emphasis. States are assessing more waters and are striving to improve their monitoring capabilities and reporting procedures. EPA is encouraging the use of biological and diffuse source monitoring procedures, and work is underway to develop better procedures for States to use in making assessment decisions. EPA has also developed a computerized data base to help States manage their assessment information in more useful ways.

Perhaps most importantly, the water quality assessment process itself is growing in importance as a critical tool in managing the Nation's water quality protection programs. These developments will lead to better water quality assessment in the future.

Trends in Water Quality

Is our Nation's water quality getting better or worse?

This is a question that water quality analysts are often asked, and one that is not easily answered.

We know that we have made progress since the 1970s in cleaning up the most obvious pollution problems. There are many examples of rivers that have been returned to health after the construction or upgrading of sewage and industrial wastewater treatment facilities. We know that there has been a significant rise in the number of people served by improved levels of sewage treatment. We are making strides in better enforcement of clean water laws. We are learning increasingly sophisticated and effective techniques to monitor pollution.

However, we also know that our data are limited. Because States have traditionally designed their monitoring and assessment programs, a great deal of variation exists between States in the data they collect and the analyses they use. Data that vary so widely cannot be effectively aggregated and analyzed to yield trends on a national basis.

Even within a State, it is difficult to measure trends over time because of the inherent variability in the constituents that are typically monitored. Long term monitoring records generally focus on a discrete set of traditional chemical constitutents.

However, we know now that factors other than these traditional constituents also affect water quality. Habitat degradation and toxic substances are two such problems, and data on them are limited. Furthermore, as our monitoring techniques grow more sophisticated, we are discovering the magnitude of previously under-estimated problems.

Because of these factors, the question of whether the Nation's water quality is getting better or worse is one we can only answer rather subjectively at this time. We can point to many examples of improvements, and say that significant progress has been made– but we also know that previously undetected problems are becoming evident, and that some persistent problems remain.

Some information is available on trends in water quality. For example, the Council on Environmental Quality (CEQ) has recently published a compilation of trends information on all aspects of the environment, including water. (*Environmental Trends*, CEQ, 1989.) EPA and the U.S. Fish and Wildlife Service conducted a national survey of fisheries biologists and summarized trend data for 1972–1982 for a statistically selected sample of waters. (*1982 National Fisheries Survey*, EPA, June 1984.)

RIVERS & STREAMS

When the States report on the condition of their rivers and streams, they include information on waters as diverse as the Mississippi River—2,340 miles long and draining a watershed of 1.2 million square miles; pristine mountain streams such as the headwaters of the Poudre River in Colorado; and stressed rivers that flow through urban areas, such as the Saginaw River in Michigan. In more arid parts of the country, some rivers and streams do not even carry water the year around, but rather, flow and dry out with the cycle of rains.

Since the enactment of the Clean Water Act in 1972, many programs addressing point sources of pollution have influenced the quality of our Nation's rivers and streams. For example, the construction grants program—which provided money to municipalities to construct and upgrade sewage treatment plants—has led to an additional 59 million people served by improved levels of sewage treatment. As a result, uses such as swimming and fishing have been restored in many rivers.

Possibly because we have made good progress in cleaning up this type of pollution source, we are now seeing more evidence of the impact of pollution from diffuse sources such as agricultural and urban runoff. In fact, the two leading pollutants affecting the Nation's rivers and streams are predominately of diffuse origin. These two pollutants are siltation—the smothering of stream beds by sediments, usually from soil erosion—and nutrients. Nutrients include phosphorous and nitrogen compounds such as those used in agricultural fertilizers.

Montana Department of Health and Environment

A view of the Lower Clark Fork River, Montana

Assessing Stream Quality: The Biological Approach

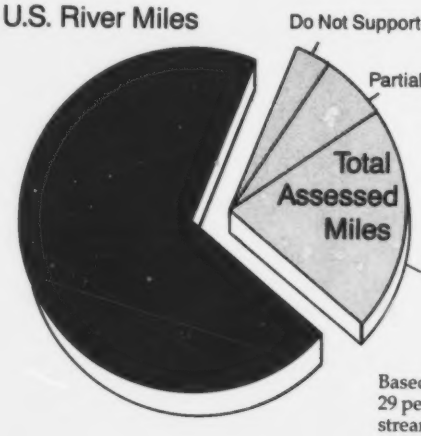
The ecological health of an aquatic ecosystem, such as a river or stream, is defined by its combined chemical, physical, and biological characteristics—the concentrations of chemical constituents in its water, sediments, and organisms; the condition of its physical habitat (e.g., stream bed, banks, vegetative cover, and streamflow); and the health, variety, and nature of the plants and animals that live within it.

Because biological condition is probably the best indicator of a stream's ecological health, EPA is developing a policy on the use of biological assessments and biological criteria in State water programs. At the core of this policy is characterizing resident aquatic communities such as fish and invertebrates.

EPA has developed relatively quick and inexpensive techniques to assess these communities in streams, and encourages their use by the States. EPA also encourages States to adopt biological criteria: numerical measures or narrative descriptions of biological conditions that define a required level of ecological "health."

Do Our Rivers and Streams Support Uses?

Twenty-nine percent of the Nation's total river and stream miles were assessed in 1988. Of those, 70 percent were found to be fully supporting their designated uses. Ten percent of those fully supporting waters were identified as threatened and could soon become impaired if pollution control actions were not taken. Twenty percent of assessed waters were reported as partially supporting uses, and 10 percent were found to be not supporting beneficial uses.

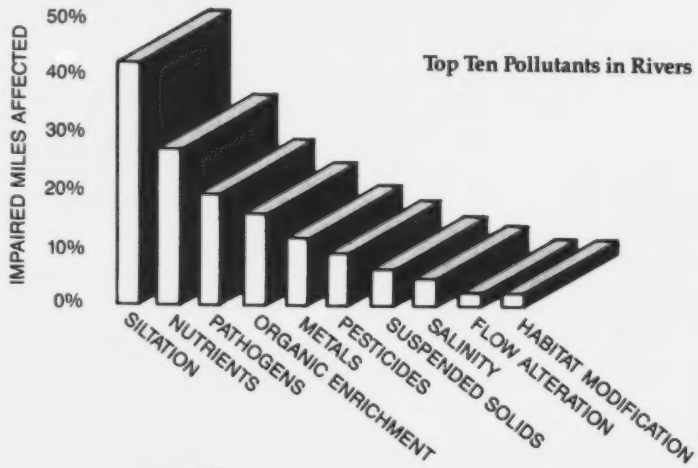


Designated Use Support in Rivers

Based on assessment of 519,412 river miles—29 percent of the Nation's estimated 1.8 million stream miles.

What is Polluting Our Rivers and Streams?

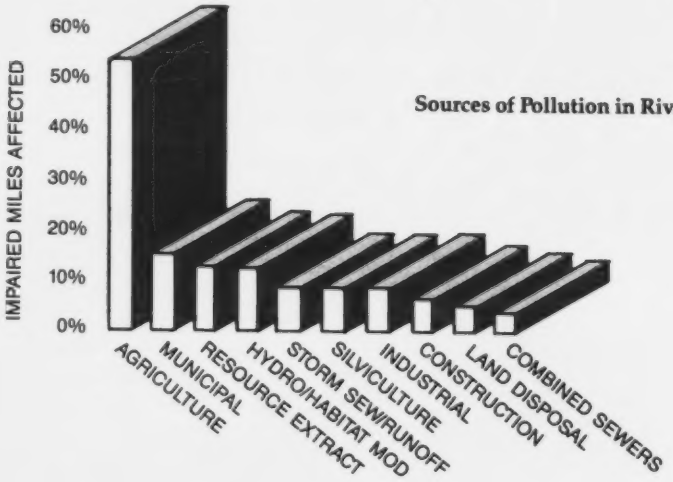
Siltation and nutrients are the most commonly reported causes of nonsupport of designated uses in our Nation's rivers and streams. Other leading pollutants include fecal coliform bacteria and organic enrichment/low dissolved oxygen.



Top Ten Pollutants in Rivers

Where Does This Pollution Come From?

The most extensive source of pollution impairing our Nation's rivers and streams is agriculture. Other extensive sources include municipal dischargers, resource extraction, hydrologic/habitat modification, and storm sewers/runoff.



Sources of Pollution in Rivers

LAKES & RESERVOIRS

The Aging Process in Lakes

Many lakes and reservoirs are known to have changed over long time periods, filling with sediments and organic material that alter their depth, biological productivity, oxygen levels, and water transparency. This natural aging process typically occurs over thousands of years.

Human activities can greatly accelerate this process by increasing the amount of nutrients and organic materials in lakes through agricultural and urban runoff, sewage discharges, septic tank failures, and similar sources. Excessive amounts of these materials overstimulate algae, plant, and weed growth, creating choked conditions that impair swimming, boating, and the health and diversity of the local fish population. This major change in lake ecology due to human activities is called cultural eutrophication.

Oligotrophic	Clear waters with little organic matter or sediment, and minimum biological activity.
Mesotrophic	Waters with more nutrients and, therefore, more biological productivity
Eutrophic	Waters extremely rich in nutrients, with high biological productivity. Some species may be choked out.
Hypereutrophic	Murky, highly productive waters, closest to the wetland status. Many clearwater species cannot survive.
Dystrophic	Low in nutrients, highly colored with dissolved humic organic matter. (Not necessarily a part of the natural trophic progression.)

CA Regional Water Quality Control Board

Recreation on Lake Tahoe, California

States reported that 30 percent of all lakes assessed for trophic status (see definitions at left) were either eutrophic or hypereutrophic; 23 percent were mesotrophic; 14 percent were oligotrophic; and less than 2 percent were dystrophic. Trophic status for the remaining 30 percent assessed was unknown.

Degree of eutrophication is one key measure of lake status, although not the only one needed to evaluate lake water quality. Like rivers and streams, lakes are affected by a myriad of pollutants and pollution sources.

EPA's Clean Lakes Program

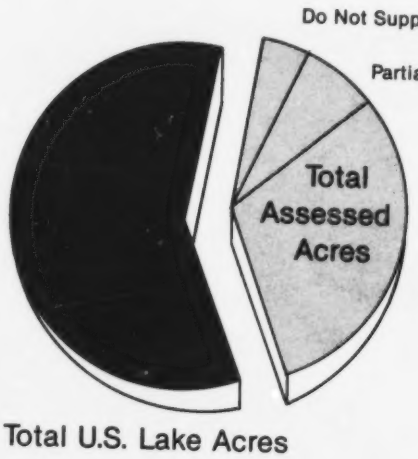
Widespread public support for preserving and protecting our Nation's lakes gave rise in 1972 to the Clean Lakes Program, which sets ambitious goals for defining the causes and extent of pollution problems in lakes, and for restoring and protecting lakes.

This program provides Federal funds to States for classification surveys, studies of lake pollution, reports outlining restoration and protection measures, lake restoration projects, and projects that affect the land management practices around lakes.

With the passage of the Water Quality Act of 1987, the Clean Lakes Program was re-authorized and expanded. States now have to report more fully on the status of their lakes in order to receive Federal grants. EPA has developed a demonstration program to improve understanding of the causes of lake damage and the effectiveness of various restoration techniques. EPA has also developed a lake restoration guidance manual for State use. In 1988–1989, EPA awarded over 150 Clean Lakes Program grants to States and Indian tribes for the study, restoration, and protection of lakes and reservoirs.

Do Our Lakes and Reservoirs Support Uses?

Forty-one percent of the Nation's lake acres were assessed by the States in 1988. Of those, 74 percent were found to be fully supporting designated uses such as swimming, fishing, and water supply. Twenty-four percent of fully supporting waters were identified as threatened and could soon become impaired if pollution control actions were not taken. Seventeen percent of assessed waters were reported as partially supporting uses, and 10 percent were reported as not supporting uses.

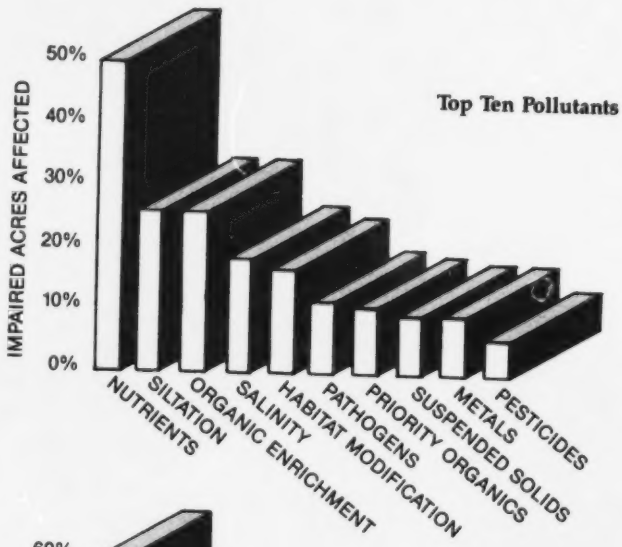


Designated Use Support in Lakes

Based on assessment of 16,313,952 lake acres—41% of the Nation's estimated 39,400,000 acres.

What is Polluting Our Lakes and Reservoirs?

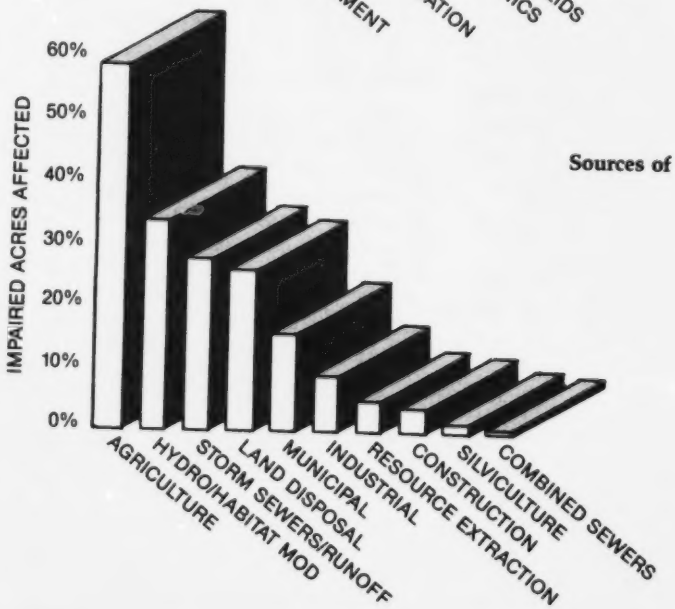
The most commonly reported cause of nonsupport of designated uses in lakes is nutrients, affecting 49 percent of impaired lake acres. Siltation and organic enrichment were other commonly cited causes of nonsupport—each affecting 25 percent of impaired lake acres.



Top Ten Pollutants in Lakes and Reservoirs

Where Does This Pollution Come From?

The most extensive source of pollution reported for our Nation's lakes and reservoirs is agricultural runoff. Other extensive sources include hydrologic/habitat modification, storm sewers/runoff, land disposal, and municipal dischargers.



Sources of Pollution in Lakes

THE GREAT LAKES

Our Inland Seas

The Great Lakes hold one-fifth of the world's fresh water and are so large that in many ways they might be better considered as freshwater inland seas. They have immense recreational and commercial value, and are unique, vital natural resources. Major urban and industrial centers such as Chicago, Detroit, Gary, Toledo, Toronto, and Buffalo are located along their shores.

The Great Lakes receive municipal and industrial discharges in many of these urban areas, and are also affected by a variety of other pollution sources including urban and agricultural runoff, hazardous waste sites, pollution brought by tributaries, and atmospheric deposition.

Since the Great Lakes are a relatively closed water system, many of the pollutants that reach them remain in the system indefinitely. Most pollutants enter the Lakes at or near the shoreline; these are the waters that studies show are the most degraded.

Partnership in Action

The Great Lakes are cooperatively protected by the U.S. and Canada under the Great Lakes Water Quality Agreement of 1978 as amended in 1987. The International Joint Commission, which was established under the 1909 Boundary Water Treaty with Canada, is responsible for identifying actions needed to maintain the integrity of the Great Lakes ecosystems. The Commission's two boards—the Great Lakes Water Quality Board and the Science Advisory Board—include members from a variety of State and Federal agencies and universities who work together to identify problem areas, plan programs to reduce pollution, and publish reports on issues and findings.

B.A. King

Looking over Lake Superior from Grand Sable Dunes.

The Great Lakes Today

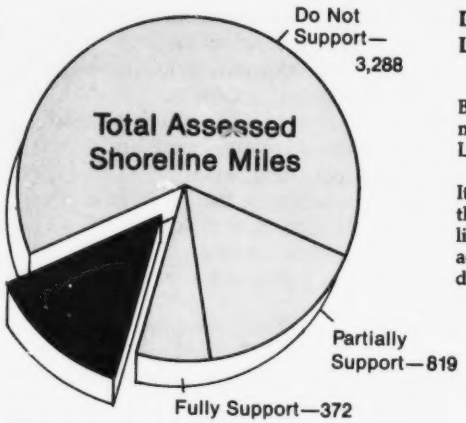
In 1988, the States reported that contamination of fish tissue and sediments by toxic substances such as mercury, PCBs, DDT, and other pesticides continues to be widespread. Fish advisories and bans are in place in many areas of the Great Lakes. However, some declines are noted in toxic substances in fish tissue—particularly in levels of DDT and mercury.

No improvement was noted for toxic contamination of sediments—a major problem in Great Lakes harbors and bays. Sediment contamination, in turn, can affect aquatic life and serve as a continuing source of toxic substances to the larger lake system. Phosphorus control programs have successfully reduced the levels of this nutrient in the Great Lakes. Improvements in the eutrophic conditions of nearshore waters are noted by several States. Nitrogen levels, however, may be increasing.

Nearshore waters—particularly harbors and river outlets—seem to have the greatest problems with sediment contamination, industrial and municipal pollution, combined sewer overflows, and tributary inputs.

Do the Great Lakes Support Uses?

Of those assessed Great Lake shoreline miles, 8 percent were found to be fully supporting their designated uses. Four percent of those fully supporting waters were identified as threatened waters that could soon become impaired if pollution control actions were not taken. Eighteen percent of assessed waters were reported as partially supporting uses, and 73 percent were reported as not supporting uses. The low rate of support is largely the result of fishing advisories and bans in effect throughout the nearshore waters of the Lakes.



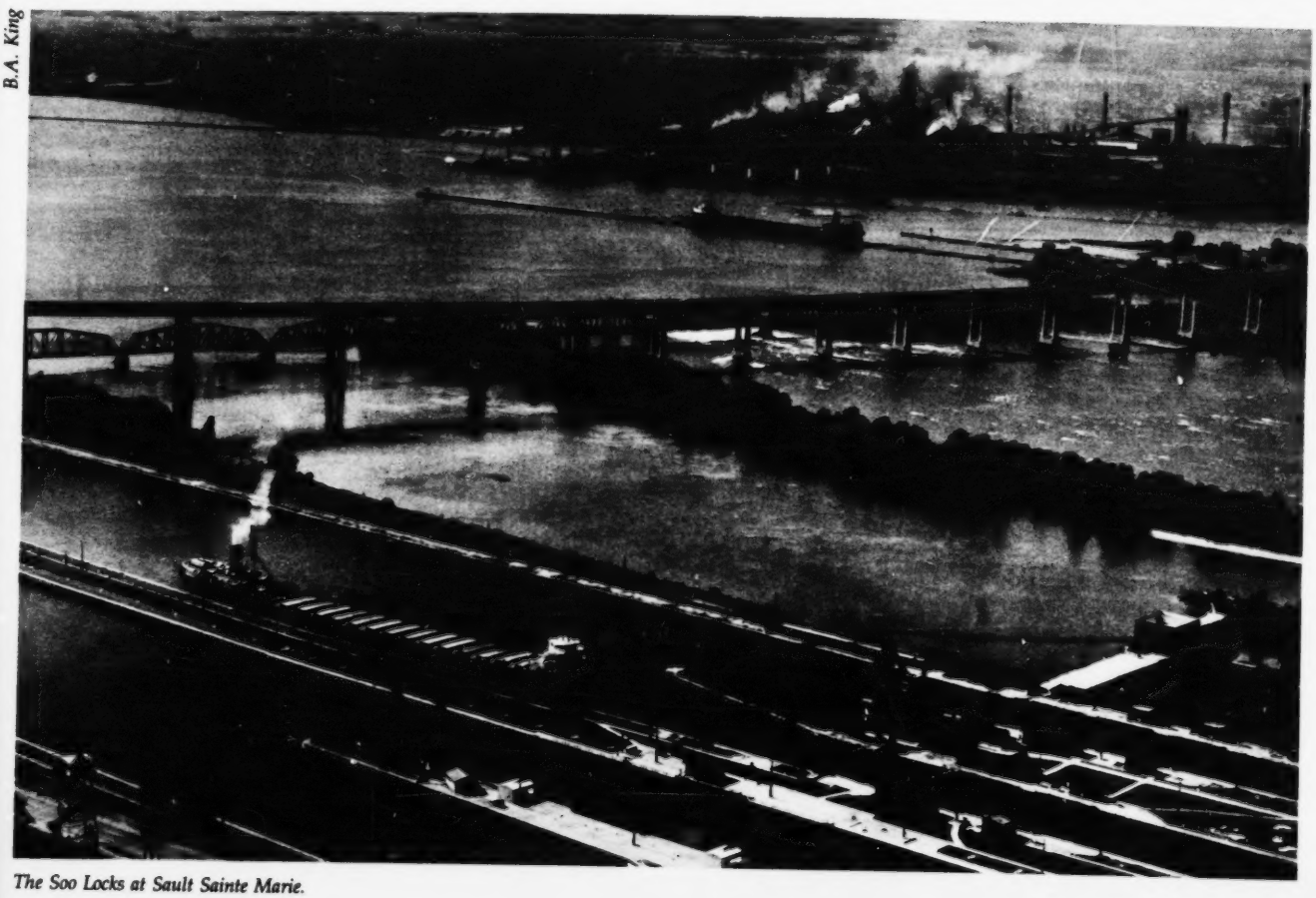
Total U.S. Great Lakes Shoreline Miles

Designated Use Support in the Great Lakes

Based on assessment of 4,479 shoreline miles—87% of the total number of Great Lakes shoreline miles in the U.S.

It should be noted that it is the waters near the shores of the Great Lakes that are most likely to be degraded. This figure does not address water quality conditions in the deeper, cleaner, central waters of the Lakes.

B.A. King



The Soo Locks at Sault Sainte Marie.

ESTUARIES

Where Rivers Meet the Sea

Estuaries are areas partially surrounded by land where ocean tides meet fresh river water. Acre for acre, estuaries are some of the most productive regions on earth. This high productivity is caused by nutrients which are easily trapped in the ecosystem—trapped in a physical sense by the ocean tide and fresh water flow patterns, and in a biological sense because nutrients are tied up in the natural food chain.

Estuaries provide an excellent environment for many species to thrive, and serve as nurseries to many ocean dwelling creatures, such as salmon and shrimp.

Working to Save Estuaries—The National Estuary Progam

The National Estuary Program (NEP) was created in 1985 to protect and restore water quality and living resources in the Nation's estuaries. Through the NEP, States nominate estuaries of national significance that are threatened or impaired by pollution, development, or overuse. EPA evaluates the State nominations and selects those that support a national demonstration program. Comprehensive conservation and management plans are developed which provide a strategy to manage environmental problems. Management conferences are convened to seek solutions to the problems that have been identified in the estuaries.

Each estuary program seeks to:

- increase public understanding of the nature of the estuary and rank its problems,
- provide State and local managers with the best scientific and technical information available on well-defined problems,
- focus efforts on the need for, and benefits of, system-wide and basin planning, and
- gain acceptance for the public and private costs of increased pollution controls and restoration of living natural resources.

Programs have been initiated for 17 estuaries: San Francisco Bay/Delta and Santa Monica Bay (California); Albemarle/Pamlico Sound (North Carolina); Puget Sound (Washington); Buzzards Bay (Massachusetts); Narragansett Bay (Rhode Island); Long Island Sound (New York and Connecticut); New York/New Jersey Harbor (New York and New Jersey); Delaware Bay (Pennsylvania, New Jersey and Delaware); Delaware Inland Bays (Delaware); Sarasota Bay (Florida); Galveston Bay (Texas); Casco Bay (Maine); Massachusetts Bay (Massachusetts); Tampa Bay (Florida); Indian River Inlet (Florida); and Barataria-Terrebone Basin (Louisiana).

North Carolina Division of Coastal Management

Do Our Estuaries Support Uses?

Of the estuarine square miles assessed, 72 percent were found to be fully supporting their designated uses. About 2 percent of those were identified as threatened waters that could soon become impaired if pollution control actions were not taken. Twenty-three percent of assessed waters were reported as partially supporting uses, and 6 percent were reported as not supporting uses.

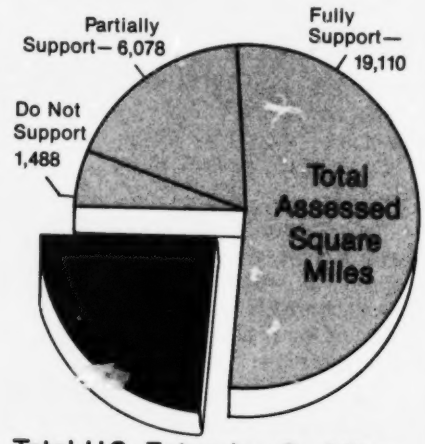
What is Polluting Our Estuaries?

The most commonly reported causes of nonsupport of designated uses in our Nation's estuaries are nutrients and pathogens, affecting 50 and 48 percent of total impaired square miles, respectively. Organic enrichment/low dissolved oxygen was found to affect 29 percent of impaired waters. Eutrophication (caused by overabundant nutrients) and high levels of bacteria—which can lead to shellfish gathering restrictions and bans—appear to be the leading threats to our estuaries.

Where Does This Pollution Come From?

Municipal discharges are reported as the most extensive source of estuarine pollution, followed by resource extraction, storm sewers/runoff, and land disposal.

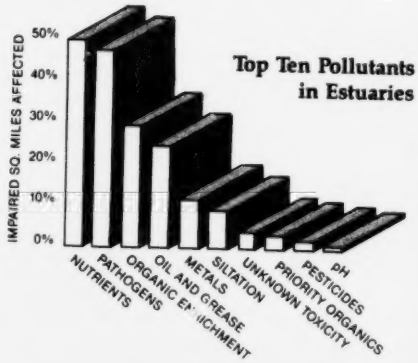
OCEAN COASTAL WATERS



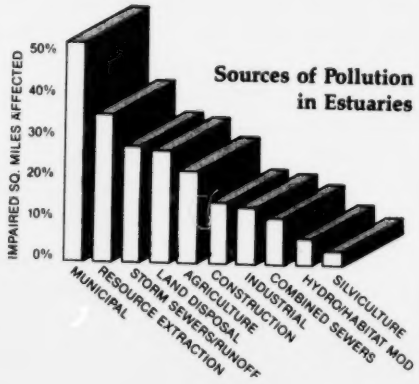
Total U.S. Estuarine Sq. Miles

Designated Use Support in Estuaries

Based on assessment of 26,676 square miles—76% of the Nation's estimated square miles of estuaries.



Top Ten Pollutants in Estuaries



Sources of Pollution in Estuaries

We may think of our ocean coastal waters as extensions of the vast oceans beyond and, therefore, generally unaffected by human activity. In reality, all of the world's oceans are feeling the impact of pollution, especially the waters near our coasts.

Near-Coastal Water Pilot Projects

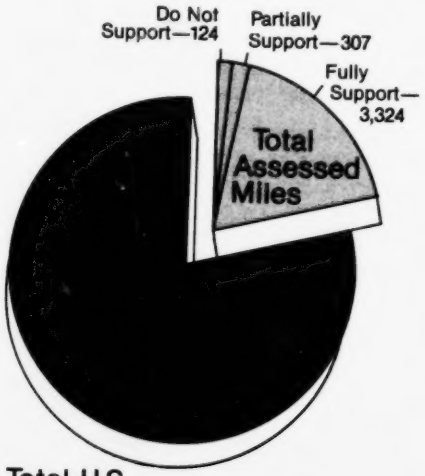
The Near-Coastal Water Pilot Projects are joint State-EPA efforts to demonstrate innovative management actions in selected U.S. near-coastal waters. These management actions can then be applied in other areas of the country. Projects include:

- Developing a computerized Advanced Information System to help officials quickly and accurately assess impacts of proposed actions on natural resources in Delaware's inland bays;
- Developing a comprehensive action plan for Oregon's coastal watersheds;
- Developing a framework of strategies to protect and enhance Florida's and Alabama's Perdido Bay.

Do Our Ocean Coastal Waters Support Uses?

Only about 20 percent of the Nation's estimated miles of ocean coastal waters were evaluated and reported on by the States in 1988. This lack of complete data, as well as inconsistencies in assessment methodologies, makes it difficult to gain a national view of the status of these waters. For example, data on pollutants and sources of pollution are too sparse to be summarized for this report.

Of those coastal shoreline miles assessed, 89 percent were found to be fully supporting their designated uses. Two percent of those were identified as threatened waters that could soon become impaired if pollution control actions were not taken. Eight percent of assessed waters were reported as partially supporting uses, and 3 percent were reported as not supporting uses.



Total U.S. Ocean Coastal Miles

Designated Use Support in Assessed Ocean Coastal Waters

Based on assessment of 3,755 coastal shoreline miles—only about 20% of the Nation's estimated 19,200 miles of ocean coastline. (Estimate of total coastal shoreline miles excludes figures for Connecticut, Rhode Island, and Alaska.)

WETLANDS

Fascinating and Fragile

"Wetlands" is a collective term for marshes, swamps, bogs, and similar areas that are often saturated by water. Wetlands may be coastal or inland, salt or freshwater, and as diverse as the Florida Everglades, sphagnum-heath bogs in Maine, coastal Alaskan salt marshes, and the shallow, seasonally flooded prairie potholes of the Great Plains. Once considered wastelands to be drained or filled, wetlands are vibrant, productive ecosystems, and create critical buffers between the land and open water.

Our Nation's wetlands provide habitat for a huge number of plants and animals, including many endangered species. Approximately two-thirds of the major U.S. commercial fish species depend on estuaries and salt marshes for nursery or spawning grounds. Coastal wetlands are essential to the proliferation of many species of shrimp, blue crabs, clams and oysters. Wetlands are extremely important to their own resident bird species, and also serve as breeding grounds and wintering areas for migratory birds.

Wetlands play an important role in flood control by absorbing peak flows and releasing the water slowly. Along coastlines, they buffer land against wave damage and capture suspended solids, building up the shoreline.

Wetlands can also improve water quality in adjacent waterbodies by filtering out contaminants such as nitrogen, phosphorus, pesticides, heavy metals, and suspended solids from runoff before it reaches open water.

Recreational and commercial fishing, bird hunting, and the cultivation of wild rice and cranberries in wetlands add from $20 to $40 billion annually to our Nation's economy. We spend almost $10 billion a year just photographing and observing wetland-dependent birds.

A Disappearing Treasure

Once there were over 200 million acres of wetlands in the lower 48 States. In 1984, the U.S. Fish and Wildlife Service estimated that only 99 million acres remained. (An additional 200 million acres are estimated to exist in Alaska.) Wetland destruction was estimated to be continuing at the rate of 458,000 acres per year.

Drainage of inland wetlands for farming was responsible for 87 percent of the losses between the mid-50's and mid-70's. Urban and other development was responsible for 13 percent. Urban development was the major cause of coastal wetland losses outside of Louisiana. (In Louisiana, most wetland loss has resulted from land subsidance.)

Major Causes of Wetland Loss and Degradation

Human Impacts

- Drainage
- Dredging and stream channelization
- Deposition of fill material
- Diking and damming
- Tilling for crop production
- Grazing by domestic animals
- Discharge of pollutants
- Mining
- Alteration of hydrology

Natural Threats

- Erosion
- Subsidence
- Sea level rise
- Droughts
- Hurricanes and other storms
- Overgrazing by wildlife

Protecting Our Wetlands

Section 404 of the 1972 Clean Water Act has developed into the most important Federal regulatory program for the protection of wetlands.

This Section gives the U.S. Army Corps of Engineers and EPA the authority to issue permits to protect the environment from the adverse impact of the discharge of dredged or fill materials.

The Corps of Engineers processes 13,000 project applications each year for various water projects that might affect wetlands. EPA, with various Federal agencies and State governments, assists in the review and approval of these applications—saving an estimated 50,000 acres of wetlands a year.

In 1987, the 20 members of the independent National Wetlands Policy Forum convened to provide policy recommendations to Federal, State, and local officials, and to wetland owners and users, on protecting wetlands. Forum participants included three governors, various local officials, developers, environmentalists, farmers, academicians, and representatives from the forestry, oil, and gas industries. The Forum set the goal—which EPA has since adopted—of "no overall net loss" in the Nation's remaining wetland base, and to restore and create wetlands, where feasible.

In further actions to protect wetlands, the 1985 Farm Bill discontinued subsidies to farmers who

drain and plant in wetlands. Many States have developed programs to regulate activities that affect wetlands and to encourage wetland preservation. These programs include permitting, coastal zone management, wetland acquisition, and heritage programs, to name a few.

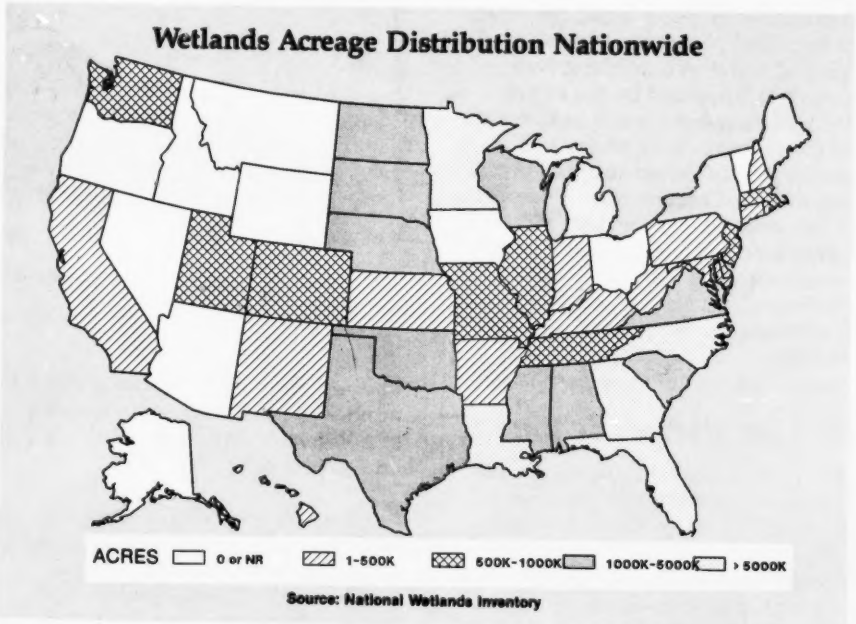
Citizens are learning that they can protect wetlands by building on upland sites, donating wetlands or funds to purchase wetlands to conservation agencies, preserving wetlands on their property, and building ponds where wetland species are introduced and encouraged.

More remains to be done. Draining and filling of wetlands continues in many areas. Mapping of our Nation's wetlands is incomplete. Only 27 States specifically include wetlands in their definition of "State waters," thereby ensuring that they are subject to the same water quality standards as other surface waters. EPA and the States are continuing to work together to provide a comprehensive store of information on the status of our Nation's wetlands.

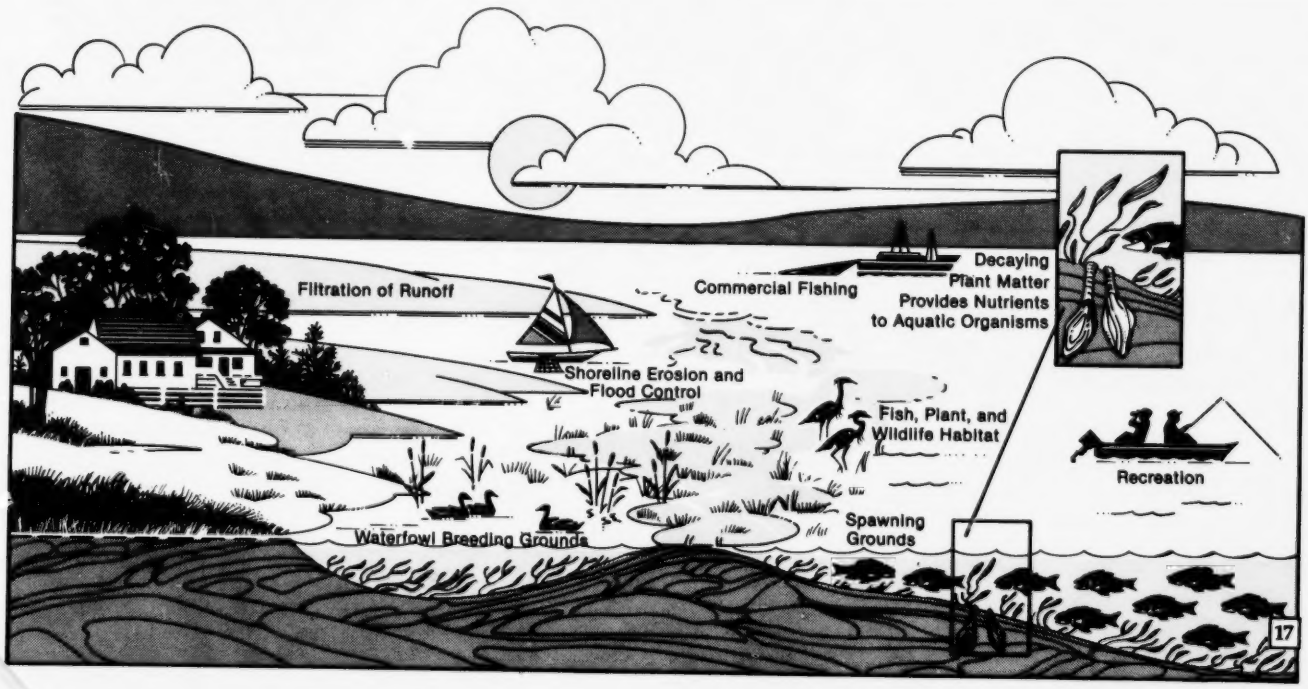
The National Wetlands Inventory

The National Wetlands Inventory (NWI) is a long-term program of the U.S. Fish and Wildlife Service to map the Nation's wetlands and track the loss of wetlands every 10 years. Wetland maps developed by the NWI provide the only reliable source of information about the extent of wetlands in the U.S.

Wetlands are mapped primarily by the use of good quality, high altitude aerial photography. To date, approximately 60 percent of the lower 48 States, 100 percent of Hawaii, and 16 percent of Alaska are mapped.



The Wetland Ecosystem

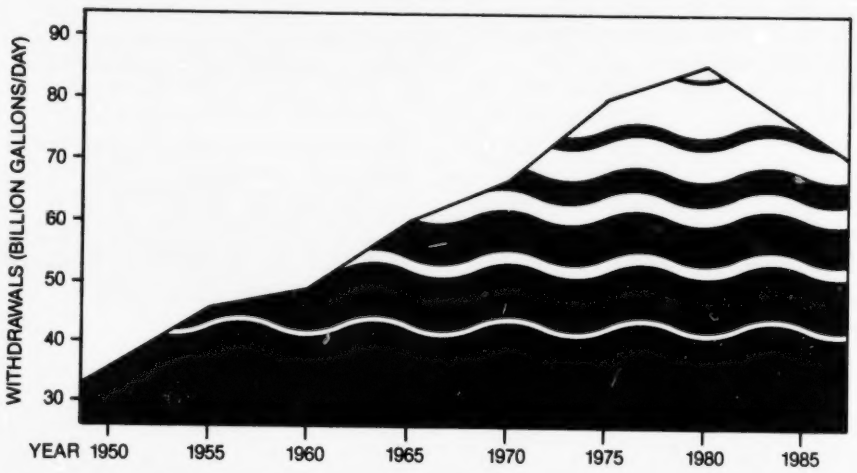


GROUND WATER

Ground water—water stored in natural underground formations called aquifers—is one of our Nation's most important water resources. In many parts of the country, it is the only reliable source of water for drinking and other domestic uses.

Just over 50 percent of the Nation's population relies on ground water as a source of drinking water (see map, p. 19). The importance of good-quality ground water as a drinking water source is illustrated by the heavy reliance on ground water in all regions of the country. In 12 States and Territories, ground water supplies drinking water for greater than 75 percent of the population. The vast majority of the Nation's rural population relies on potable ground-water sources to provide water for domestic use. Only five States rely on ground water to provide domestic supply for less than 25 percent of their population.

National Use of Ground Water
1950–1985



Source: U.S. Geological Survey Open-File Report 88-112.

Over the past 35 years, our rate of ground-water use has risen significantly.

A Threatened Resource

As we have come to rely more and more on ground water, we have learned that it can be quite vulnerable to contamination. An increasing number of pollution incidents affecting both public water supplies and private wells have been reported throughout the country.

In 1988, over half the States identified the following major threats to the quality of their ground water:

- leaking underground storage tanks (for example, gasoline storage tanks at service stations and heating oil supply tanks for schools and public buildings);
- poorly operating septic systems;
- agricultural activities such as crop dusting, irrigation, and manure spreading;
- poorly managed or poorly located municipal landfills used to dispose of non-hazardous waste products and household waste;
- improperly located or designed surface impoundments—pits, ponds, and other holding areas for liquid wastes used by municipalities and industries for receiving hazardous and non-hazardous wastes:
- abandoned and uncontrolled hazardous waste sites such as those subject to cleanup under the EPA "Superfund" program.

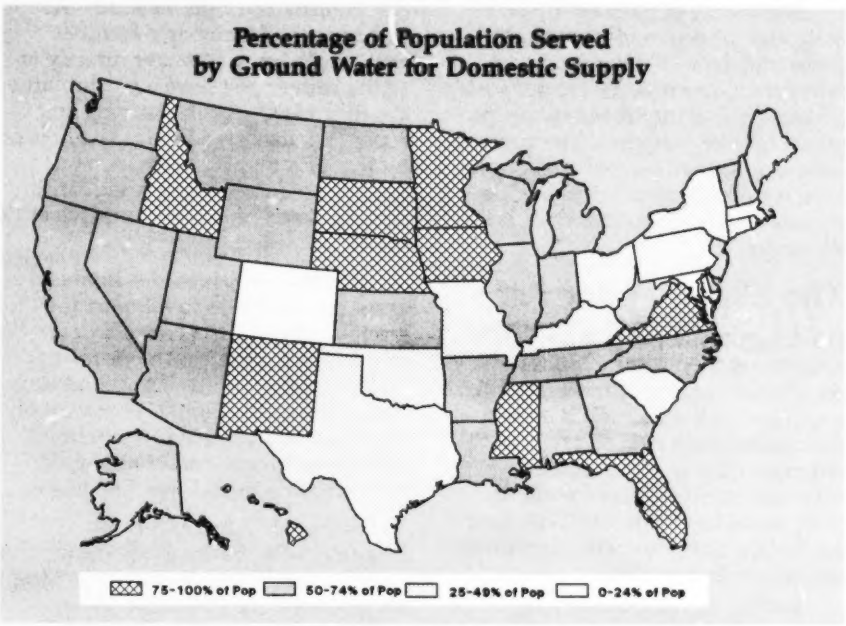
More than half the States identified nitrates, pesticides, volatile organic compounds, petroleum products, metals, and brine as contaminants of concern originating from these sources of pollution. Other contaminants include bacteria, solvents, acids, and tanning wastes.

Protecting Our Ground-Water Resources

As a result of a growing awareness of the importance of ground water and its vulnerability to pollution, many States are developing and expanding legislation, regulations, and programs to protect ground water. Preventing ground-water pollution is especially important because of the difficulty and cost involved in cleaning up contaminated aquifers, providing alternative supplies of water, or treating the water that is used in public systems.

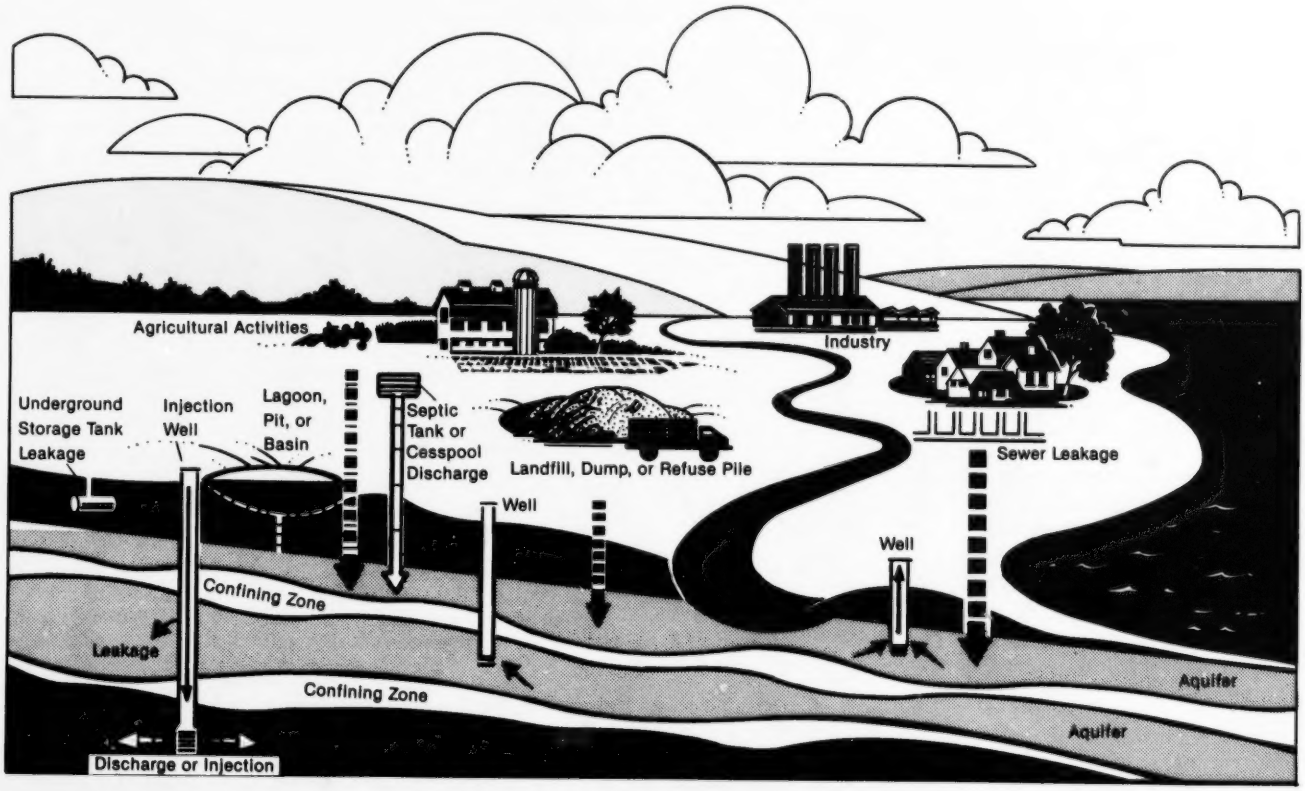
Almost all the States have ground-water protection strategies or are in the processing of developing them. These strategies typically outline goals and objectives for addressing ground-water problems; contain information on the nature and location of State ground-water resources; and describe programs to protect ground-water quality and generate public interest in protection activities.

Other State activities to protect ground water include adopting legislation to manage specific sources of contamination and set standards for protection; identifying and mapping ground-water resources and potential sources of contamination; and developing innovative approaches such as wellhead protection programs. While the States have primary responsibility for protecting and managing their ground-water resources, EPA works in partnership with them through programs mandated by the Clean Water Act, the Safe Drinking Water Act, and other national legislation. EPA's own Ground-Water Protection Strategy provides an approach for integrating the many control and cleanup programs into a comprehensive management "framework."



Source: 1988 State Section 305(b) Reports or 1986 U.S.G.S. National Water Summary

Sources of Ground Water Contamination



WATER QUALITY PROTECTION

EPA works in partnership with State and local governments to improve and protect water quality. A number of laws provide the authority to develop and implement water pollution control programs. The primary statute addressing water quality protection in the Nation's rivers, lakes, estuaries and wetlands is the Clean Water Act.

The Clean Water Act

The Clean Water Act (CWA) of 1972 determines the way the Federal government and the States regulate sources of pollution, and has been the driving force behind many of the improvements in water quality we have witnessed in recent years. In 1987, amendments to the CWA gave the Nation a new impetus to protect and restore our waters.

Among the provisions of the 1987 amendments are a new financing mechanism for municipal wastewater treatment; the imposition of tighter controls on toxic substances; and a comprehensive framework for accelerated efforts to control nonpoint (diffuse) sources of pollution.

The CWA and its amendments provide certain tools to address water pollution:

Water Quality Standards and Criteria—States adopt EPA-approved standards for their waters that define the uses for these waters, and specific criteria—limits on pollution—to protect those uses.

Effluent Guidelines—EPA develops nationally consistent discharge limits for individual pollutants in industrial discharges and sewage treatment plants. These guidelines are then used to set permit limits under which dischargers must operate. Additional controls may be required based on the water quality of the receiving waters.

Permits and Enforcement—All industrial and municipal facilities that discharge wastewater directly into the water must have a permit, and are responsible for monitoring and reporting discharge levels. The States and/or EPA inspect dischargers to determine if they are in compliance. Appropriate enforcement actions are taken as needed.

Grants—EPA provides financial assistance to States to support programs such as the construction of municipal sewage treatment plants; water quality monitoring, permitting and enforcement; implementation of nonpoint source pollution controls; and development and implementation of State ground-water strategies.

Nonpoint Source Control Program—The States are granted primary responsibility for controlling nonpoint source pollution. They receive funds to analyze its extent and to develop needed water quality management programs. EPA's role has traditionally been to provide program guidance, technical support, and funding.

The 1987 amendments to the CWA include provisions to encourage States to accelerate efforts to control nonpoint source pollution. The amendments require States to prepare a nonpoint source Assessment Report and a 4-year Management Program. Funds are provided to assist the States in implementing these programs. New deadlines were established to address runoff from urban areas through the development of a permit program for stormwater discharges. EPA is also required to report to Congress annually on the States' progress in controlling nonpoint source pollution.

Toxics Control Program—States develop lists of waters impaired by toxic materials, identify point sources and the amounts of pollutants they discharge that cause toxic impacts, and develop individual control strategies for each such point source. These strategies are designed to ensure that applicable water quality standards are achieved no later than June, 1992. EPA approves the State lists and individual control strate-

Mike McCarthy

gies, or develops them if States cannot do so.

Other statutes also guide the development of water quality protection activities:

The Safe Drinking Water Act—EPA establishes standards for drinking water quality. Local water supply systems are required to monitor their drinking water periodically to determine if these standards are being met. Periodic monitoring of wells used for underground injection of hazardous wastes is also required. EPA is authorized to award grants to States to develop and implement programs to protect drinking water resources at the tap and in the ground.

Resource Conservation and Recovery Act (RCRA)—States and EPA manage programs emphasizing ground-water protection through standards for hazardous waste treatment, storage and disposal facilities, and for municipal solid waste landfills. EPA also develops a program for managing certain categories of underground storage tanks.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—EPA and the States operate programs to clean up contaminated ground water. Emergency response and remedial actions are authorized.

SPECIAL CONCERNS: FISH CONSUMPTION ADVISORIES AND BANS

Toxic chemicals discharged to rivers, lakes and estuaries may be absorbed or ingested by aquatic organisms that are, in turn, consumed by larger predators such as fish. Toxic substances can accumulate in these fish, which then pose a health threat to the humans who eat them. When States find levels of toxic substances in fish tissue exceeding established safety standards, they issue fishing advisories or bans.

National statistics regarding advisories and bans are incomplete. There is a great deal of variability in the States' criteria used to establish restrictions, and in the programs to monitor and report on toxic substances in fish tissue. Therefore, States reporting large numbers of restrictions may simply have better established fish tissue monitoring or reporting programs than other States. In 1988, 47 States provided information on this topic to EPA. Thirty-nine states reported a total of 586 advisories, and a total of 135 bans were reported by 21 States.

The pollutants most commonly identified as leading to advisories or bans include PCBs, chlordane, mercury, dioxin, and DDT. Sources contributing these pollutants include industrial discharges, landfills, hazardous waste sites, and non-point sources, such as spills, in-place contaminants, atmospheric deposition, and agricultural activities.

Fishing Restrictions Nationwide

Source: 1988 State Section 305(b) Reports

* Zero or no reported restrictions.

YOU CAN MAKE A DIFFERENCE

Governmental regulation and enforcement have helped clean up many waters and slow the degradation of others. But government alone cannot solve the entire problem. There are many things that you, as an individual, can do to further preserve and protect our Nation's waters.

Be Informed

You should learn about water quality issues that affect the communities in which you live and work.

Become familiar with your local water resources. Where does your drinking water come from? If you apply pesticides and fertilizers, where might they end up after a rainfall? What other activities in your area might affect the water you drink, or the rivers, lakes, beaches, or wetlands you use for recreation?

Learn about procedures for disposing of harmful household wastes so they don't end up in sewage treatment plants that can't handle them, or in landfills not designed to receive hazardous materials.

Involved citizens: volunteers in Kentucky's Water Watch program participate in stream cleanups.

Read Up On Water Quality

U.S. Environmental Protection Agency. 1988. *America's Wetlands: Our Vital Link Between Land and Water.* Office of Wetland Protection. OPA-87-016. February.

U.S. Environmental Protection Agency. 1989. *Nonpoint Source Agenda for the Future.* Office of Water. January.

U.S. Environmental Protection Agency. 1989. *Report to Congress: Activities and Programs Implemented under Section 319 of the Clean Water Act, FY 1988.* Office of Water. EPA-506/9-89/003. August.

U.S. Environmental Protection Agency. 1989. *Report to Congress: Water Quality of the Nation's Lakes.* Office of Water. EPA-440-5-89-003.

U.S. Geological Survey. 1988. *1986 National Water Summary.* Water Supply Paper 2325.

U.S. Environmental Protection Agency. 1990. *National Water Quality Inventory: 1988 Report to Congress.* Office of Water. EPA-440/4-90-003.

U.S. EPA, Rhode Island Sea Grant College Program. 1990. *National Directory of Citizen Volunteer Environmental Monitoring Programs.* Office of Water/University of R.I., EPA 503/9-90-004. April.

Be Responsible

A first step in preserving our water resources is to practice water conservation. The less water you use, the more water remains clean. But there is also much you can do to help to reduce the amounts of organic materials, silt, nutrients, and toxic materials that wash into our local waters.

In your yard, seek alternatives to pesticide/herbicide use, and use landscaping to control erosion. If you are a land owner or manager, consult your local county extension office about methods of restoring stream banks in your area by planting buffer strips of native vegetation. Water your lawn conservatively or develop landscaping techniques that require little watering. Don't waste water when you wash your car. Keep litter, pet wastes, leaves, and grass clippings out of gutters and storm drains. Never dispose of any household, automotive, or gardening wastes in a storm drain. Keep your septic tank in good working order.

In your home, fix any dripping faucets or leaky pipe and install water-saver shower heads. Always follow directions on labels for use and disposal of household chemicals. Take used motor oil, paints, and other hazardous household materials to proper disposal sites such as approved service stations or designated landfills. Use non-phosphate detergents and try substituting non-hazardous substances for household chemicals such as drain cleaners and bleaches

Learn How to Safely Dispose of Household Chemicals

Be Involved

As a citizen and voter there is much you can do at the community level to help preserve and protect our Nation's water resources.

Look around. Is soil erosion being controlled at construction sites? Is new development destroying wetlands or critical aquatic habitats? Are new subdivisions installing stormwater retention basins and maintaining natural buffer strips along stream courses? Is the community sewage plant being operated efficiently and correctly? Is the community trash dump in or along a stream? Is road deicing salt being properly stored?

It is important to know where your elected officials stand on water quality and environmental issues—and let your opinions be heard! Many communities have recycling programs; find out about them, learn how to recycle, and volunteer to help out if you can. One of the most important things you can do is find out how your community regulates development, construction activities, and other activities with potential water quality impacts, and speak out if you see problems.

Volunteer Monitoring: You Can Become Part of the Process

In many areas of the country, citizens are becoming personally involved in monitoring the quality of our Nation's water. As a volunteer monitor, you might be involved in taking ongoing water quality measurements, identifying sources of pollution, tracking the progress of protection and restoration projects, and/or reporting special events, such as fish kills and storm damage.

Volunteer monitoring can be of great benefit to State and local governments. Some States stretch their monitoring budgets by using data collected by volunteers, particularly in remote areas that might otherwise not be monitored at all. Because you are familiar with the water resources in your own neighborhood, you are also more likely to spot unusual occurrences such as fish kills, and you are also more likely to be aware of local pollution sources.

The benefits to you of becoming a volunteer monitor are also great. You will learn about your local water resources and have the opportunity to become personally involved in a nationwide campaign to protect a vital, and mutually shared, resource. If you would like to find out more about organizing or joining volunteer monitoring programs in your State, contact your State department of environmental quality, or write to:

U.S. EPA
Volunteer Monitoring (WH-553)
401 M Street, S.W.
Washington, D.C. 20460

For further information on water quality in your state, write to your State department of environmental quality. Additional water quality information may be obtained from the U.S. EPA and Regional offices of the U.S. EPA (see back cover).

Regional Offices

EPA Region 1
JFK Federal Building
Boston, MA 02203
(617) 565-3424

Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont

EPA Region 2
26 Federal Plaza
New York, NY 10278
(212) 264-2515

New Jersey, New York, Puerto Rico, Virgin Islands

EPA Region 3
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-9370

Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia

EPA Region 4
345 Courtland Street, NE.
Atlanta, GA 30365
(404) 347-3004

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

EPA Region 5
230 South Dearborn Street
Chicago, IL 60604
(312) 353-2072

Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

EPA Region 6
1445 Ross Avenue
Dallas, TX 75202
(214) 655-2200

Arkansas, Louisiana, New Mexico, Oklahoma, Texas

EPA Region 7
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7006

Iowa, Kansas, Missouri, Nebraska

EPA Region 8
One Denver Place
999 18th Street, Suite 1300
Denver, CO 80202
(303) 293-1692

Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

EPA Region 9
1235 Mission Street
San Francisco, CA 94103
(415) 556-6322

Arizona, California, Hawaii, Nevada, American Samoa, Guam, Trust Territories of the Pacific

EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101
(206) 442-1465

Alaska, Idaho, Oregon, Washington